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(54) Title: WOUND TREATMENT COMPOSITION

(57) Abstract

A composition for use in treating a wound, e.g. cavity wounds, comprises a hydrogel containing O-carboxymethyl chitosan or N,O-carboxymethyl chitosan and a plasticising compound.

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WOUND TREATMENT COMPOSITION

The present invention relates to compositions which are useful in the treatment of wounds. The invention relates more particularly to such compositions which incorporate O-carboxymethyl chitosan (OCC) or N-, O- carboxymethyl chitosan (NOCC) which are a water soluble derivatives of chitin.

NOCC is a known material and its preparation is disclosed for example in US-A-4,619,995. Briefly NOCC may be prepared by a solid phase reaction between chitosan and monochloroacetic acid under alkaline conditions. The degree of substitution can be varied but is typically 0.6 to 1.0. OCC may be produced by a similar procedure effected to give a degree of substitution of 0.3-0.5.

According to a first aspect of the present invention there is provided a composition for use in treating a wound comprising a hydrogel containing OCC or NOCC and a plasticising compound.

Compositions in accordance with the invention are useful in the treatment of cavity wounds, e.g. decubitus ulcers. The compositions are introduced into the wound and pressed firmly into the base thereof. For preference the wound is then covered and sealed by a film having a high MVTR, typically 3,000 to 12,000 g m^{-2} $24hr^{-1}$ (e.g. hydroderm (ex Wilshire Medical) or IT425 or IT625 (ex Innovative Technologies)). The compositions may also be used in the treatment of sinuses.

Preferred compositions in accordance with the invention have a viscosity in the range 20,000 to 100,000 cP.

Compositions in accordance with the invention will generally contain a maximum of 5% by weight of OCC and/or NOCC. Typically the OCC or NOCC content will be in the range 2-4%.

The plasticiser will generally be present in a maximum amount of 20% by weight, more usually in the range 2-20% by weight.

Examples of plasticiser include polyhydroxy compounds, e.g. glycerol, sorbitol, propylene glycol, and polyethylene glycol (a preferred example of which is PEG 400). The most preferred plasticiser glycerol.

The aqueous phase of the gel will for preference comprise isotonic buffered saline, e.g. phosphate buffered saline.

Additional components may be included in the composition to enhance their healing properties. Examples include antimicrobial agents which may be used at a level of 1-2% of the composition. A preferred anti-microbial agent is chlorhexidine gluconate.

Antimicrobial properties may also be achieved by use of enzymes, e.g. glucose oxidase/lactic acid peroxidase enzymes as a natural disinfection system activated by glucose (present in exudate).

A further possibility is to include a component, e.g. pectin, which facilitates wound debridement. This component may for example be used in an amount up to 20%, more preferably up to 10%, e.g. 0.05-1% by weight.

Compositions for use in accordance with the invention may be produced in various ways. For example a composition may be produced by dissolving the required

amounts of OCC or NOCC (e.g. 3-5%), plasticiser and any other components in phosphate buffered saline at 90°C then cooling. The composition may be sterilised by autoclaving at 120°C for 15 minutes.

The gels obtained may be incorporated into a convenient delivery system, e.g. a syringe, sachet, tube or squeeze bottle, for introduction into a wound.

The invention is illustrated by the following non-limiting Example.

Example

A gel was produced by dissolving 3-4% NOCC and 1-2% high methoxy pectin (Bulmers) in isotonic phosphate buffered saline at pH 7 with 2% glycerol. The gel was filled into a vessel and autoclaved at 120°C for 15 minutes. The viscosity of the gel reduced slightly during autoclaving but by no more than 10%.

CLAIMS

1. A composition for use in treating a wound comprising a hydrogel containing OCC or NOCC and a plasticising compound.

2. A composition as claimed in claim 1 containing a maximum of 5% by weight of OCC and/or NOCC.

3. A composition as claimed in claim 2 containing 2-4% by weight OCC and/or NOCC.

4. A composition as claimed in any one of claims 1 to 3 wherein the plasticiser is present in an amount of less than 20% by weight.

5. A composition as claimed in any one of the preceding claims wherein the plasticiser is a polyhydroxy compound.

6. A composition as claimed in claim 5 wherein the plasticiser is glycerol, sorbitol, propylene glycol or polyethylene glycol.

7. A composition as claimed in any one of the preceding claims wherein the aqueous phase of the gel comprises isotonic buffered saline.

8. A composition as claimed in any one of the preceding claims additionally incorporating an anti-microbial agent.

9. A composition as claimed in claim 8 wherein the anti-microbial agent is chlorhexidine gluconate.

10. A composition as claimed in any one of claims 1 to 8 incorporating glucose oxidase/lactic acid hydrogenase enzymes.

11. A composition as claimed in any one of the preceding claims containing pectin for wound debridement.

12. A composition as claimed in any one of the preceding claims having a viscosity in the range 20,000 to 100,000 cP.

13. A composition as claimed in any one of the preceding claims which has been sterilised by autoclaving.

14. A composition as claimed in any one of the preceding claims incorporated in a delivery system.

15. The combination of a composition as claimed in any one of the preceding claims and a film having a high MVTR capability.

16. The combination as claimed in claim 15 wherein the film has an MVTR of 3,000 to 12,000 g m^{-2} $24hr^{-1}$.

INTERNATIONAL SEARCH REPORT

International Application No
PC.,GB 95/02542

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61L25/00 A61L15/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61L C08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,3 903 268 (BALASSA LESLIE L) 2 September 1975 see column 2, line 35 - line 36 see column 3, line 7 - line 47 ---	1-16
Y	US,A,4 659 700 (JACKSON DAVID S) 21 April 1987 see claims ---	1-16
A	EP,A,0 426 368 (PFIZER HOSPITAL PROD) 8 May 1991 see examples ---	1
A	EP,A,0 356 060 (MINNESOTA MINING & MFG) 28 February 1990 see claims --- -/--	1

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	ESPINOSA, M

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JOURNAL OF BIOACTIVE AND COMPATIBLE POLYMERS, vol. 5, no. 4, October 1990 US, pages 396-410, XP 000213548 R.A.A.MUZZARELLI ET AL. 'N-CARBOXYBUTYL CHITOSAN AND FIBRIN GLUE IN CUTANEOUS REPAIR PROCESSES' see abstract ---	1

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 95/02542

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